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SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
PRIMATE-FIXATION DEVICE FOR RETINAL PHOTOGRAPHY AND EXPERIMENTA--ETC(U)
FEB 77 C H BONNEY, & E CONLEY, D M HUNTER

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**PRIMATE-FIXATION DEVICE FOR RETINAL
PHOTOGRAPHY AND EXPERIMENTAL
HIGH LET RADIATION EXPOSURE**

February 1977

Interim Report for Period May 1975-April 1976

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USAF SCHOOL OF AEROSPACE MEDICINE
Aerospace Medical Division (AFSC)
Brooks Air Force Base, Texas 78235



NOTICES

This interim report was submitted by personnel of the Radiation Biology Branch, Radiation Sciences Division, USAF School of Aerospace Medicine, Aerospace Medical Division, AFSC, Brooks Air Force Base, Texas, under job order 1921E18A.

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The animals involved in this study were procured, maintained, and used in accordance with the Animal Welfare Act of 1970 and the "Guide for the Care and Use of Laboratory Animals" prepared by the Institute of Laboratory Animal Resources-National Research Council.

This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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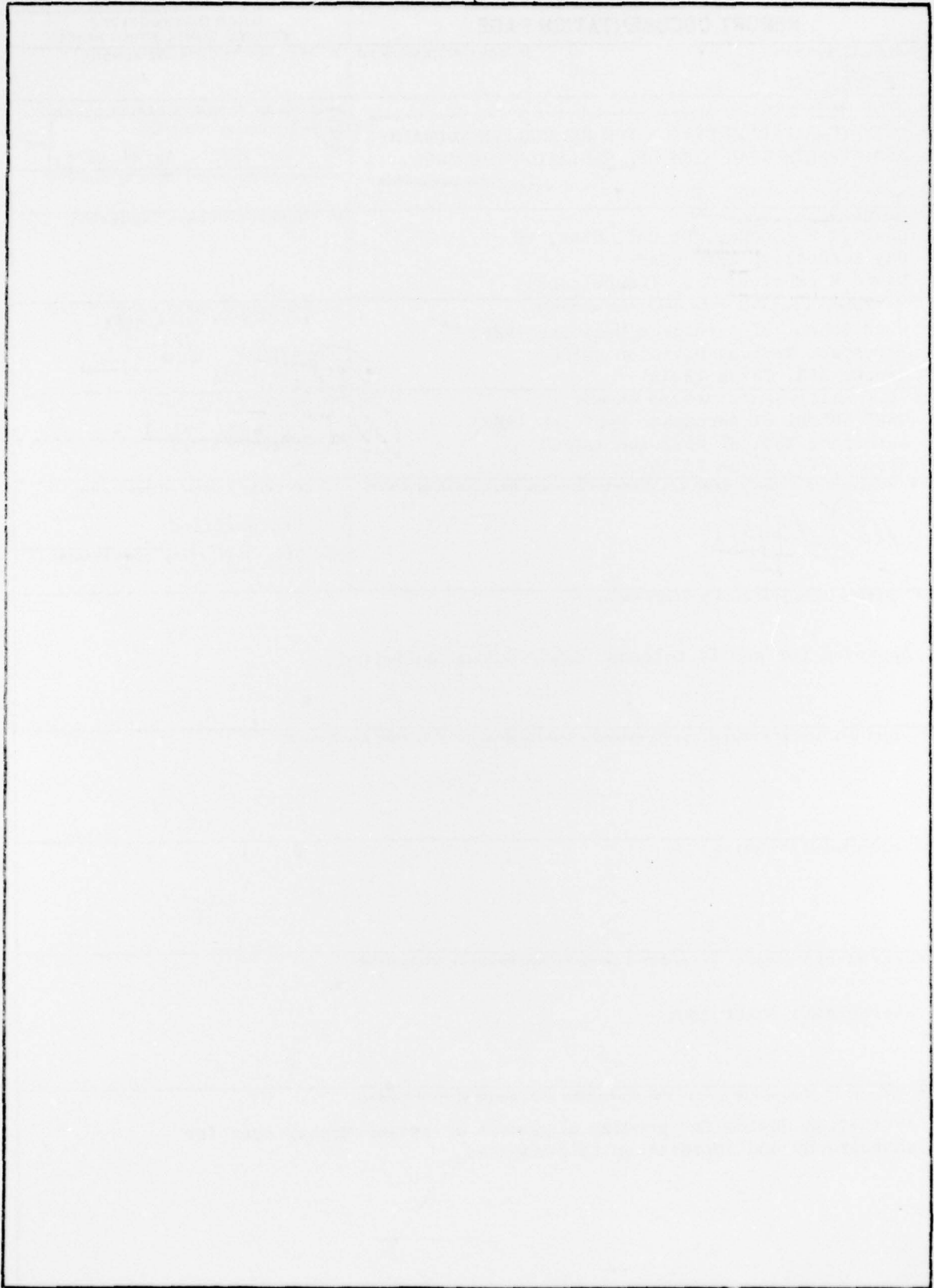
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PRIMATE-FIXATION DEVICE FOR RETINAL PHOTOGRAPHY AND EXPERIMENTAL HIGH LET RADIATION EXPOSURE

INTRODUCTION

The laboratory production of accelerated atomic nuclei has provided the radiobiologist with the opportunity to conduct controlled experimentation with particles of high linear energy transfer (LET). A series of experiments have been conducted to evaluate the effects of such radiation upon the retina of nonhuman primates (Macaca mulatta).*

For these exposures a device was required to allow precise alignment of the retinal area of the eye to be exposed. Exact alignment was necessary (1) for photographing and conducting fluorescein angiography of the retina, and (2) to fixate the retina for radiation exposures. Furthermore, the design criteria had to assure that the area of the retina viewed during the photography would be the same as the retinal area aligned with the radiation beam during the exposures.

To accomplish these goals, a visual stereotaxic instrument was modified and mounted upon a specially designed platform (Fig. 1).

The platform was utilized by placing it upon a stand (Fig. 2) which allowed adjustments to be made in 3 degrees of freedom. Identical positioning of animals could be made between identical stands by utilizing the scales on each of the stands for each of the degrees of freedom.

USE OF STAND AND FUNDUS CAMERA

For examining the retina, one stand is mounted on a common base with a fundus camera (Figs. 3, 4, 5). A second stand is left mounted in front of the radiation source. An experimental animal can then be moved between stands for radiation and retinal observation and photography. By noting the 3-position scales of the stand and resetting these scales, the area of the retina originally examined is thus returned to the axis of the camera.

The anesthetized animal is placed into the stereotaxic instrument with eyelids closed so as to retard drying of the cornea. A coarse focus of the fundus camera may be obtained by observing the background illuminating light of the camera upon the closed lid of the animal. A dark spot will appear on the lid in the center of the illuminating light.

*Bonney, C. H., F. N. Beckman, and D. M. Hunter. Retinal changes induced in the primate (Macaca mulatta) by oxygen nuclei radiation. In COSPAR Life Sciences and Space Research XII, Proceedings of the Open Meeting of the Working Group on Space Biology of the Sixteenth Plenary Meeting of COSPAR, pp. 31-42, Akademie-Verlag, Berlin, 1974.

This spot is generated by the fundus camera. The anterior-posterior adjustment of the stand is used to bring this spot into focus on the lid. Upon raising the lid, the vessels of the fundus should be visible with the appropriate lens setting on the camera. This setting for the rhesus has been +22/-7.

The focus knob can then be used to bring the fine detail of the retina into sharp focus. While viewing the retina, two types of reflections may be noted. A peripheral orange or red glare indicates that the animal is too close to the camera and should be backed away; a blue glare indicates the animal is too far away. These are millimeter adjustments. The cornea center of rotation adjustment of the platform may be used to eliminate these reflexes (Fig. 1) and in many cases is all that is required. During a long period of exposures, corneal wetting is required and has been successfully accomplished by using a methylcellulose wetting solution marketed for use with contact lens.

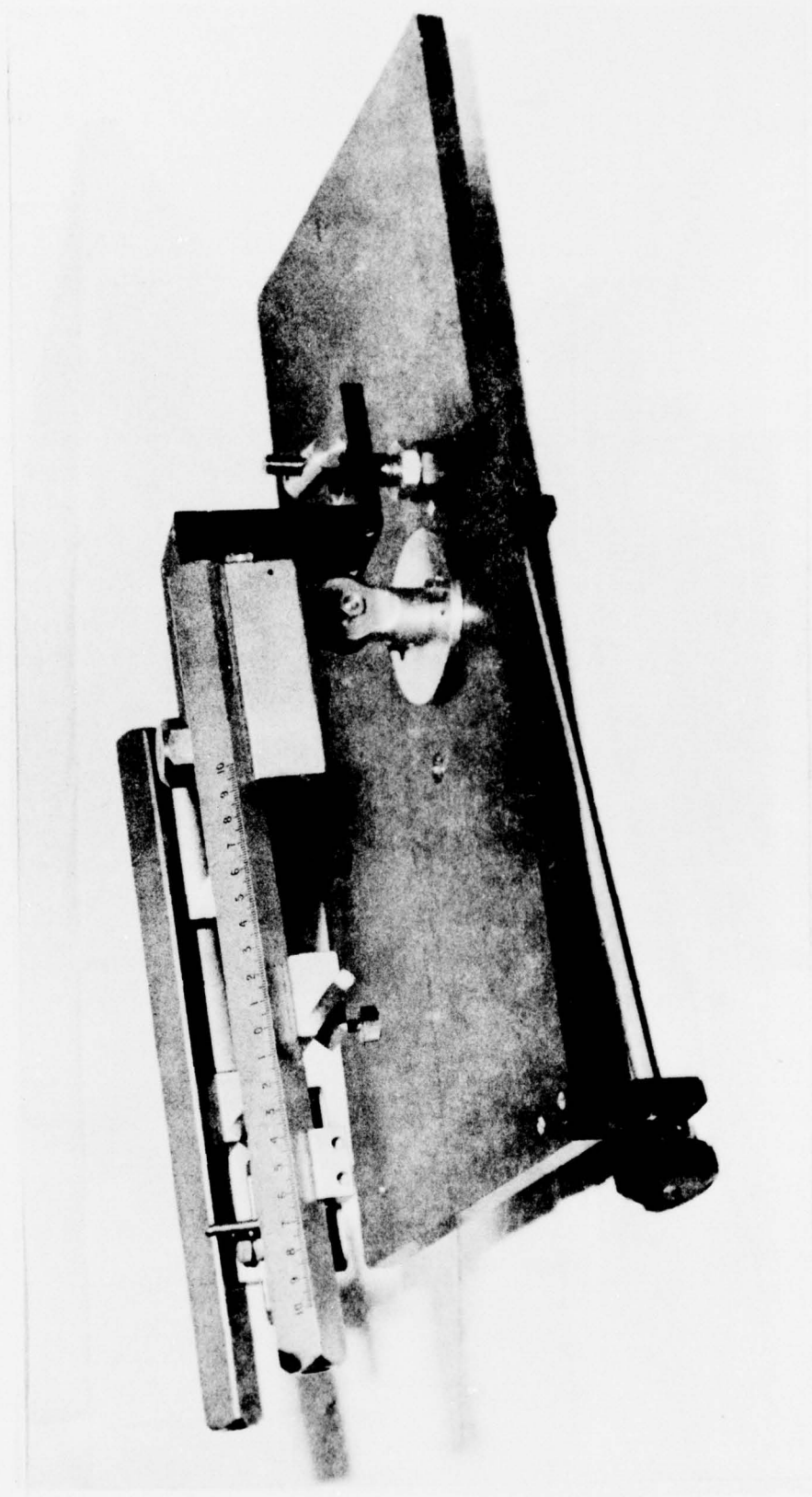


Figure 1. A standard commercial visual stereotaxic instrument mounted on a specially designed platform. Height adjustments can be made through a simple gear train.

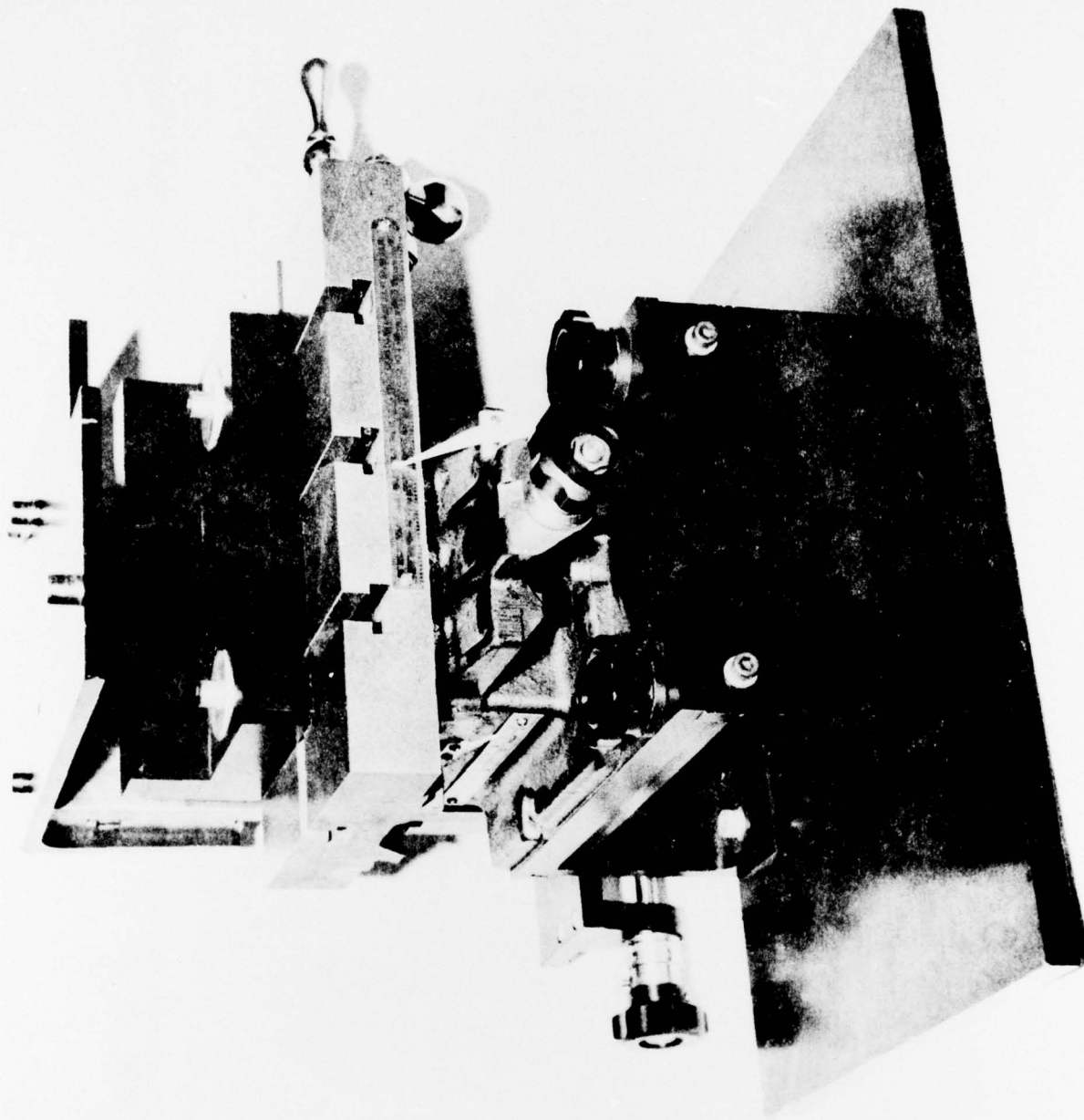


Figure 2. A specially designed stand possessing three degrees of freedom. Note the scales and indicators. A platform can be moved between stands and identically positioned on each stand.

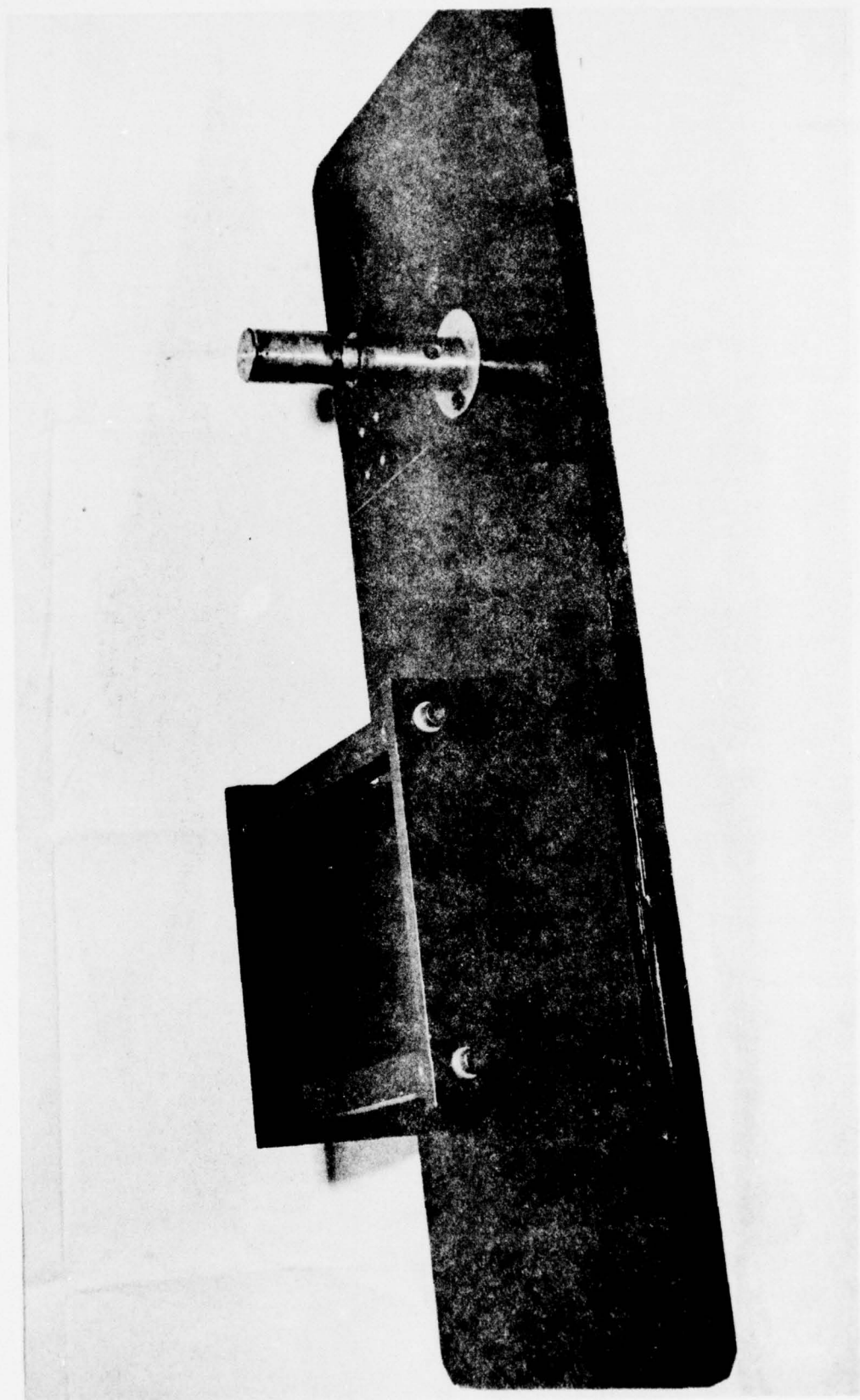


Figure 3. The common base used to accept a stand and fundus camera.
(The mounting post is for a Zeiss fundus camera.)

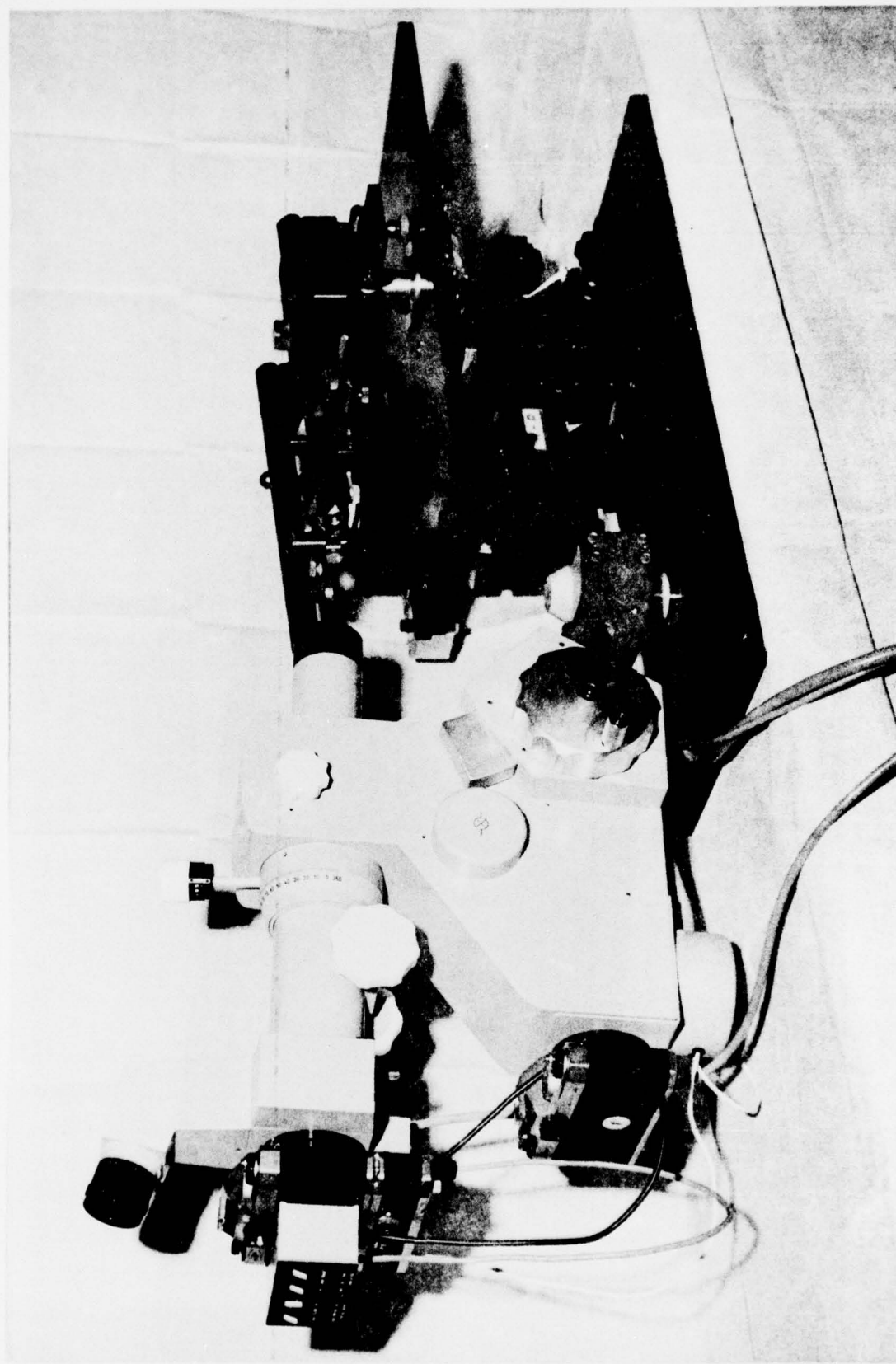


Figure 4. Fundus camera mounted on a common base with stand (Fig. 2) and platform (Fig. 1).

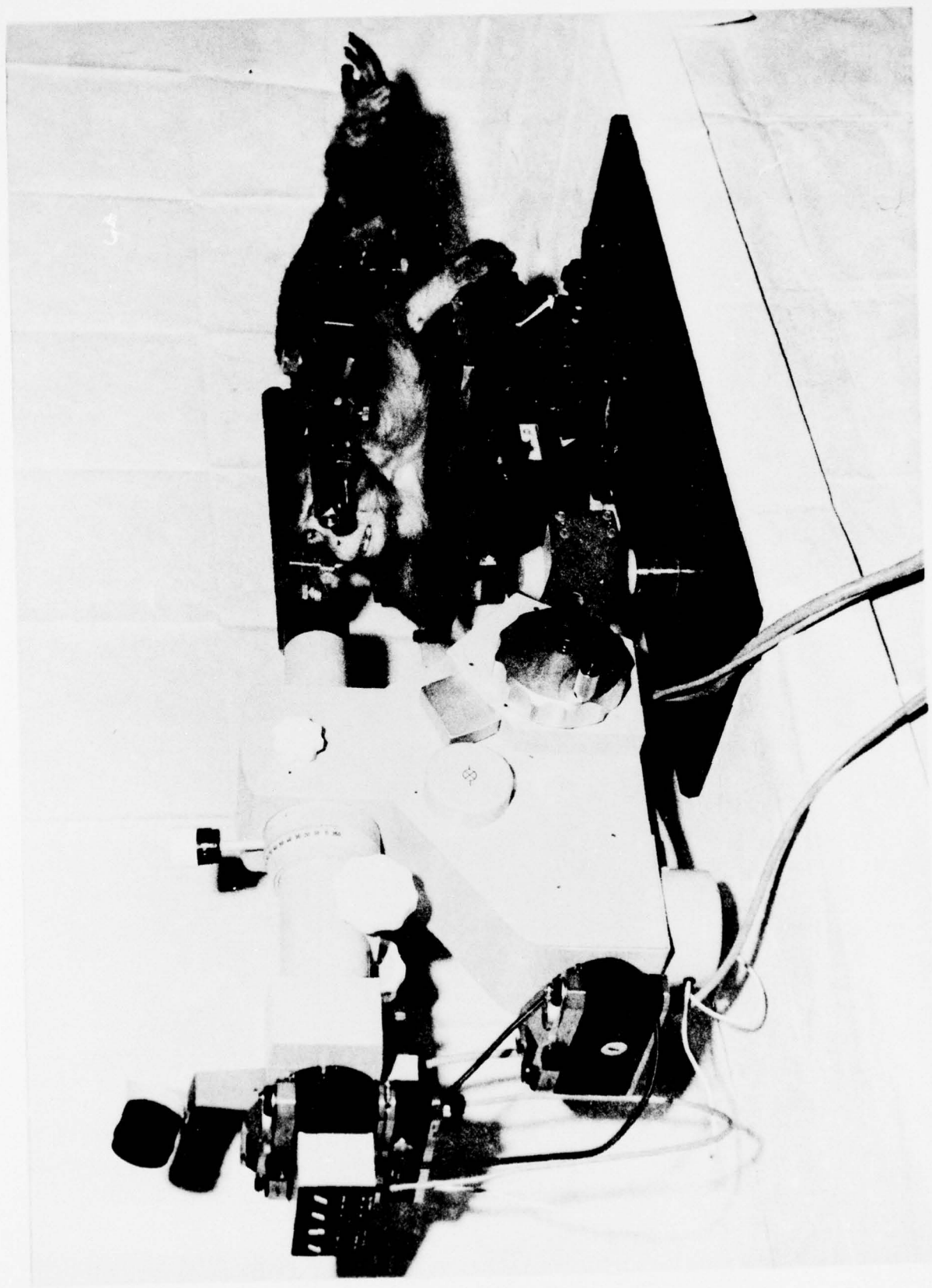


Figure 5. Rhesus monkey positioned on the platform for funduscopic examination and photography.

